REMARKS

Claims 1 through 13 are now presented for examination. Claims 1, 9, 12 and 13 have been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record. Claims 1, 9, 12 and 13 are the only independent claims.

Claims 1-13 have been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 5,227,948 (Boon et al.) in view of U.S. Publication 2002/012121615 (Nakasuji), Korean Patent Document KR 2001065114 (Ha et al.) and U.S. Publication 2005/0229690 (Kikuchi et al.). With regard to the claims as currently amended, this rejection is respectfully traversed.

Independent Claim 1 as currently amended is directed to magnetic guiding apparatus that guides a moving member along the length of a sliding member by attracting a target disposed along the length of the sliding member by electromagnets provided on the moving member. In the apparatus, a magnetic detection unit on the guided moving member detects magnetic flux along the length of the target during movement of the moving member along the length of the sliding member. A position measuring unit measures the position of the magnetic flux detection unit on the guided moving member along the length of the sliding member. A detection unit detects the position of the magnetic flux peak along the length of the target based on the output of the magnetic flux detection unit and the position measuring unit. A demagnetization unit performs demagnetization at the detected position of the magnetic flux peak.

Independent Claim 9 as currently amended is directed to stage apparatus in which a moving member guided by a target having a length extending along a directed is movable along the length of the target. Electromagnets on the moving member produce a force between the target and the electromagnets. A magnetic flux detection unit provided on the moving member

detects magnetic flux during moving member movement along the length of the target. A position measurement unit measures the position of the magnetic flux detection unit on the moving member along the length of the target. A detection unit detects a position of the magnetic peak flux along the length of the target based the output of the magnetic flux detection unit and the position measuring unit.

Independent Claim 12 as currently amended is directed to a demagnetization method that performs demagnetization of a magnet guide apparatus which has a moving member along the length of a target. According to the method, magnetic flux along the length of the target is detected by magnetic flux detecting unit movable along the target. The position of the magnetic flux detection unit on the moving member during movement of the moving member along the length of the target is measured. The position of a magnetic flux peak along the length of the target is detected based on the measured position and the detected magnetic flux. Demagnetization is performed at the detected position of the magnetic flux peak.

Independent Claim 13 as currently amended is directed to magnetic guiding apparatus that guides a moving member along the length of a beam by attracting a target disposed along the length of the beam by electromagnets provided on the moving member. In the apparatus, a magnetic flux detector on the guided moving member detects a magnetic flux along the length of the target during movement of the moving member along the length of the target. A position measuring unit measures the position of the magnetic flux detector along the length of the target. A detection unit detects the position of the magnetic peak along the length of the target based on the outputs of the magnetic flux detector and the position measuring unit. A demagnetization unit performs demagnetization at the detected position of the magnetic flux peak.

In Applicant's view, Boone et al. discloses an electromagnetic device that positions a body (5) by means of at least two electromagnets (13, 15). A position sensor (29) measures the size of an air gap (23) between one of the electromagnets (13, 15) and a guide beam (1). An output signal of the position sensor (29) is applied to an electronic control unit (35) which passes a control current through the electromagnets (13, 15) in dependence on a difference between the measured and a desired size of the air gap (23). An electronic multiplier (47, 59) is connected between the control unit (35) and each of the electromagnets (13, 15), multiplying a control signal from the control unit (35) by the output signal from the position sensor (29). In this way, a force exerted by the electromagnets (13, 15) on the guide beam (1) depends exclusively on the value of the control signal and not on the size of the air gap (23) so that a position-independent control is obtained. Such an accurate position-independent control may be used in an optical lithographic device for the irradiation of semiconductor substrates. Alternatively, such an electromagnetic support with a position-independent control may be constructed so as to form a micromanipulator.

In Applicant's opinion, Nakasuji discloses a charged particle beam (CPB) microlithography system that effectively cancels the effects of floating external magnetic fields and that exhibit a high magnetic shielding ratio using small components. the system has a search coil situated and configured to detect external magnetic field. A compensation coil situated and configured to produce a magnetic field that, based on the detected magnetic field, cancels the external magnetic field. These coils desirably are situated downstream of an illumination lens. The external magnetic field detected by the search coil is converted to a corresponding electrical signal by an external-magnetic-field-detection circuit and routed to an external-magnetic-field-

compensation circuit to which the compensation coil is connected. The external-magnetic-field-compensation circuit cancels the external magnetic field by providing an electrical current, corresponding to the detected external magnetic field, to the compensation coil. A search coil and compensation coil also can be provided in a similar manner downstream of a second projection lens, and provided with a respective external-magnetic-field-detection circuit and external-magnetic-field-compensation circuit.

Ha et al., in Applicant's view, discloses a demagnetizer that has an electromagnetic chuck(1), a rod(2), a driving motor(3), a driving cylinder for forward and backward motion(4), and a driving cylinder for rise and fall(5). The electromagnetic chuck(1), magnetized as power is supplied, generates magnetism. The rod(2) is connected to the electromagnetic chuck(1). The driving motor(3) rotates the rod(2) selectively. The driving cylinder for forward and backward motion(4), connected to the driving motor(3), moves the electromagnetic chuck(1) forward and backward so that it can be located around a magnetism-removed portion. The driving cylinder for rise and fall(5) moves the driving cylinder(4) up and down to separate the electromagnetic chuck(1) from a magnetism generating portion or to make it approach.

Kikuchi et al., in Applicant's opinion, discloses a tire temperature and heat deterioration sensor in which a change of magnetic characteristics of a magnetic circuit constituting body or a composite magnet arranged in a necessary portion of a tire is detected by a magnetic sensor detecting a magnetic field leaked from the magnetic circuit constituting body or a magnetic field from the composite magnet, while a temperature in the necessary portion of the tire is directly measured or a degree of heat deterioration is directly measured by using a tire temperature sensor or a tire heat deterioration detection sensor constructed so as of change the

magnetic characteristics of the magnetic circuit constituting body or the composite magnet dependent on the temperature or the degree of heat deterioration in the necessary portion of the tire. It is thereby possible to attain an early identification of the abnormality on the possibility bringing about the troubles of the tire. Also, there is provided a tire temperature sensor or a tire heat deterioration detection sensor causing no fear of the early battery drain.

According to the invention of Claims 1, 9, 12 and 13, magnetic flux along the length of a target is detected by a magnetic flux detection means during movement of a moving member along the length of a sliding means on which the target is disposed. The position of the magnetic flux detection means on the guided moving member along the length of the sliding member is measured and the position of the magnetic flux peak along the length of the target is detected based on the output of the magnetic flux detection means and the the position measuring means. Advantageously, the magnetized position in the target is identified by moving the magnetic flux detection means in the entire movable region on the target and detecting magnetic flux and storing position information and magnetic flux information of the target.

Boon et al. discloses a device that positions a body by means of two electromagnets (13, 15) in which a position sensor measures the size of the air gap and an electronic control unit passes a control current through the electromagnets based on the difference between the measured and desired size of the air gap. In contrast to Boon et al.'s air gap control, it is a feature of Claims 1, 9, 12 and 13 that magnetic flux along the length of a target disposed along the length of a sliding member is detected during movement of a guided moving member which carries a magnetic flux detection means. The position of the magnetic flux detection means along the length of the sliding member is measured and the position of the magnetic flux peak

along the length of the target is detected responsive to the outputs of the magnetic flux detection means and the position measuring means. Boon et al.'s air gap measurement and control is independent of the position of a moving member 5, 19, 21 on a guide 1, does not detect a magnetic flux peak along the length of a target on a sliding member. As a result, Boon et al. fails to teach or suggest magnetic detecting means on a guided moving member that detects magnetic flux along the length of a target during movement of a guided moving member along the sliding member, position measuring means on the guided moving member that measures the position of the magnetic flux detection means along the sliding member length or detecting the position of a magnetic flux peak.

Nakasuji only teaches fixedly located search and compensation coils and only generates a cancelling magnetic field. There is no teaching or suggestion in Nakasuji of a target disposed along the length of a sliding member with a moving member which has magnetic flux detection means thereon that provides magnetic flux detection during movement of the moving member along the length of the sliding member, position measurement means on the moving member to measure the position of detected magnetic flux and demagnetization and magnetic flux peak detection responsive to the outputs of the magnetic flux detection and position measurement as in proposed Claims 1, 9, 12 and 13.

Ha et al. may teach a demagnetizer with a driving cylinder for forward and backward motion. There is, however, no suggestion in Ha et al. of a moving member having magnetic flux detection means thereon to detect magnetic flux along the length of a target on the sliding member during movement of the moving member along the length of the sliding member or measurement of the position of the magnetic flux detection means as in proposed Claims 1, 9, 12

and 13. Kikuchi et al. may teach detection of a tire abnormality if a detected magnetic flux density peak is smaller than a threshold. The Kikuchi et al. arrangement, however, is devoid of detecting the position of a magnetic flux peak along a sliding member as in Claims 1, 9, 12 and 13. Accordingly, Kikuchi et al.'s detection of magnetic flux peak fails to suggest any of the features related to a moving member and a sliding member in a magnetic guiding apparatus.

With regard to the cited combination, Boon et al.'s measurement of the air gap between a moving member and a guide beam is independent of the position of the moving member along the guide beam and fails in any manner to suggest the detection of the position of a magnetic flux peak along the length of a sliding member as in Claims 1, 9, 12 and 13. Nakasuji is restricted to teaching fixedly located search and compensation coils and only generation of a cancelling magnetic field but is completely unrelated to detection of the position of a magnetic flux peak as in Claims 1, 9, 12 and 13. Ha et al.'s driving cylinder fails to suggest detection of magnetic flux along the length of a target as in Claims 1, 9, 12 and 13 and Kikuchi et al.'s tire warning system is devoid of any suggestion of detecting the position of a magnetic flux peak along a sliding member as in Claims 1, 9, 12 and 13. Since none of the cited references in any manner suggests anything of detection of magnetic flux along the length of a sliding member, measurement of the position of the the magnetic flux along the length of a sliding member or detecting the position of a magnetic flux peak along the length of a sliding member, it is not seen that the cited combination devoid of this feature could possibly suggest the features of Claims 1, 9, 12 and 13. It is therefore believed that Claims 1, 9, 12 and 13 are completely distinguished from any combination of Boon et al., Naksuji, Ha et al. and Kikuchi et al. and are allowable.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 1, 9, 12 and 13, is patentably defined over the cited art, whether that art is taken individually or in combination.

Dependent claims 2-8, 10 and 11 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in independent claims 1, 9, 12 and 13. Further individual consideration of these dependent claims is requested.

Applicants further submit that this Amendment After Final Rejection places this application in condition for allowance. This Amendment was not earlier presented because Applicants believed that the prior Amendment placed the application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 CFR 1.116.

Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are also requested.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

/Jack S. Cubert/
Attorney for Applicants
Jack S. Cubert
Registration No. 24,245

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3800
Facsimile: (212) 218-2200

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